

FILE PROGRAM LIBRARY

NUMBER: Digital-4-15A-K (7-52-m)

NAME: COMBSE II

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SPEC'S: 1730 registers: 6000-7727 (4k)
16000-17727 (8k)

Tapes: AS (3 tapes)
RIM, SA 7700 (4k)
RIM, SA 17700 (8k)
Low Funny Loader, SA 100

NEEDED: RIM loader (Digital-4-2-1)
Low RIM Puncher (in assembling) (Digital-4-11-4)

PURPOSE: Maintenance program to test the instructions,
memory, clock, program interrupt, and reader,
punch and teleprinter.

CONTEST (for Continuous TEST) is designed to provide a running overall check of a PDP-1 in normal use. It will detect most of the things that may go wrong in executing instructions and will perform a quick checkboard. For very rigorous testing of memory or I/O equipment, one of the programs listed at the end of this writeup should be used.

METHOD:

CONTEST is made up of a number of small programs, each assigned to test one or a group of instructions. These programs are in the form of subroutines called from a dispatch table. Although certain instructions must in fact be working if CONTEST is to be loaded properly, only three are assumed to be operating correctly at the start of the test--`hll`, `lls`, and `gla`. Starting with `img`, the full set of instructions is tested; at any point, only those previously checked out are assumed to be working. Even the `rotate` test makes no use of the `gla` instruction, which is not tested until later.

After all the instructions have been tested, a quick and dirty checkboard is performed, testing memory up to but not including the space occupied by CONTEST. Each of four patterns is run once. Following checkboard, the program interrupt and the reader, punch and teleprinter are tested, using two clock interrupt test. An interval of 96 seconds is counted; at 0, 30, and 60 seconds the sequence 1-377 is punched on tape, while the same sequence is being read from another tape; at 0 and 60 seconds a line of gobbledygook corresponding to the teletype code 2-377 is printed. The whole program then starts over.

In the following discussion, all locations are given for the `sk` version. Add 10000 to obtain `8k` addresses.

CONTEST occupies upper memory as follows:

Instruction tests	6100 to 7141
Clock Interrupt Test	7100 to 7173
Checkboard	7200 to 7672
Dispatch Table	7700 to 7727

Constants are stored beginning in location 7442. Some on-board storage at 5000 is also used.

USAGE:

Under normal circumstances, CONTEST will run through the test programs as outlined above. The operator has control over the sequence and the device tests by using the AC switches.

- | | |
|--------|--|
| ACS 0 | up--repeat the currently running test
down--proceed to the next test in sequence |
| ACS 17 | up--stop with AC = 0 at the end of the clock interrupt test.
down--repeat the whole program from the beginning. |
| ACS 1 | up--do not read test tape during clock interrupt test
down--read the test tape |
| ACS 2 | up--do not punch test tape
down--punch test tape |
| ACS 16 | up--do not print test line
down--print test line |

Operating instructions:

1. Read in CONTEST (RIM tape)
2. If I/O devices are to be tested, turn them on, place a loop of tape punched with the sequence 1-577 in the reader; return the teleprinter carriage.
3. Start at 7700 with the AC Switches set as desired.

The tests are logically independent; the program may begin anywhere merely by starting at the proper place in the dispatch table. These addresses are given below, in order as the tests are performed. The symbol associated with each dispatch address is that assigned to the first location of the instructions; the instructions for which the test is responsible are given also.

Several of the instruction tests were written by Nancy Hurley and Gordon Bell; Gordon Bell also wrote the Clock Interrupt Test and adapted Checkboard from Leo Goswell's program for the PDP-1.

7701/		/end	
7702/	copy	/end	
7703/	copy	/end	
7704/	copy	/end	
7705/	copy	/end	
7706/	copy	/end	
7707/	copy	/end	
7708/	copy	/end	
7709/	copy	/end	
7710/	copy	/end	
7711/	copy	/end	
7712/	copy	/end	
7713/	copy	/end	
7714/	copy	/end	
7715/	copy	/end	
7716/	copy	/end	
7717/	copy	/end	
7718/	copy	/end	
7719/	copy	/end	
7720/	copy	/end	
7721/	copy	/end	

117201

To Assemble CONTEST:

There are three symbolic tapes. The source definitions tape entitled "con-defs" is produced by assembly of the source program on the control tape. To assemble, read the control tape and punch out the source tapes. Then assemble the source and word tapes.

The binary format tape unit is produced via no loader. Punch it in core, then read in the low binary loader tape which loads with the CONTEST symbolic tapes. Then place the assembled CONTEST tape in the reader and read it in location 100.

Finally, to produce a RM tape of CONTEST, read in the RM Punched and punch out the contents of locations 100 to 7721 with a start block to location 7700.

The following library program descriptions describe the pertinent sections of CONTEST in greater detail.

Checkerboard (Digital-1-14-K)

The program described here is a more comprehensive one than that included in CONTEST, but the logic and operations are the same.

Clock Interrupt Test (Digital-1-14-K)

Basically the same as in CONTEST.

For thorough testing of the I/O devices, one of the following programs should be used.

Reader and Punch Test (Digital-4-5-M) - These programs allow the user to vary the speed and the patterns read or punched on paper tape.

Teletype I/O Test (Digital-4-6-M) - Allows rigorous testing of teleprinter and keyboard.

ERROR ALARMS

Except where indicated, pressing CONTINUE will cause the program to proceed.

jump		halts are placed at 6003, 6005-7, 6014-17, 6023, 6043, and 6103. These are non-return stops and the program must be restarted from the dispatch table.
sort	6110 6163 6166	ana failed on +0. If AC=+0, ana failed AC=0 D xor failed. Otherwise, ana failed same reasons as previous stop
gloadh	6216 6222 6224 6230 6232 6237 6243 6247 6253 6256 6262 6265 6270 6273	ana failed on +0 (did not skip) ana failed on 0 ana did not skip on +AC ana skipped on -AC ana did not skip on -AC ana skipped on +AC AC=525252 D and failed. Otherwise, lac failed AC=252525 D and failed. Otherwise, lac failed +AC D ana failed to complement +0 AC properly AC=0 D recomplement failed +AC D ana failed to complement 377777 properly verification of preceding error -AC D recomplement failed verification of preceding error
link	6073 6056 6060 6063	(AC=0=1) A (L=0) D jms failed to save link L=1 D all failed (AC=0=0) M (C=1) D jms failed to save link L=0 D all failed and failed szl failed
linc	6304 6311 6316 6323 6327	law failed to load itself xloc/0 D dzm xloc failed xloc/-1 D dac xloc failed AC=+0 D incorrect indexing. Otherwise, incorrect sks AC bits on were cleared by lsz

	6332	lax failed to skip on +0
	6335	noisy AC
	6340	AC=0 D incorrect indexing
	6345	AC=(OV*1) D incorrect indexing
		AC=2 D incorrect skip
	6351	noisy AC
dmnt	6364	AC=0 D dnm failed
cast	6405	AC=525252 D acc failed
lact	6434	lax skipped on 70
	6446	lax not incrementing properly
noise	6475	AC bit on were cleared during execution of lax
rotate	6557	number did not move right on rwr
	6514	link is not the same after rwr-ral
	6517	number is not the same after rwr-ral
	6563	number did not move left on ral
	6575	link did not survive rwr-ral
	6531	number is not the same after rwr-ral
	6537	ral failed if AC=5
	6541	link not set after rll
	6546	rwr failed if AC=+0
	6550	link not set after rlr
band	6574	AC and mask do not match
	6601	AC and mask do not match
	6613	AC=+0 after completion of test
	6622	failed to change single bit from 1 to 0
addtd	6764	error in sum
	6767	incorrect overflow
	6772	error in sum
	6775	incorrect overflow
	7002	error in sum
	7005	incorrect overflow
	7012	error in sum
	7015	incorrect overflow
	6720	incorrect sum on tad
	6731	" " " "
	6745	" " " "
	6762	" " " "
autogk	7072	register does not contain 545123; automatic indexing did not work
calt	7124	link not set; cal failed
	7127	link saved as 1 on cal
	7132	address saved is incorrect

note 6850 12 bits not tested

alarm 7257 Parity bit wrong as 1 in field of zero. Program
may be restarted (7728)
7258 AC contains failed bit
7259 AC contains address of register in error

alarm 7233 clock flag set--should be clear
7234 prog interrupt on--should be off
7235 clock enable on incorrectly
7236 clog in 7242 did not turn on enable flag
7237 overflow flag on incorrectly
7238 loc in 7253 did not turn on prog interrupt
7239 unexpected break from device not tested

7243 reader interrupt did not set flag
7244 wrong character read from tape
7245 reader flag not cleared by rcf in 7314 or rca in 7315

7233 punch interrupt did not set flag
7237 flag not cleared by pcf in 7325
7247 flag not cleared by pia in 7346

7242 teleprinter flag not set after interrupt
7246 flag not cleared by tcf in 7353
7245 flag not cleared by tla in 7353

7274 keyboard flag not set after interrupt
7275 flag not cleared by kcf in 7372
7215 clock flag not set after overflow interrupt
7223 flag not cleared by clog in 7220

7226 MISPL STOP (when ASS-17 is not)

Memory Diagram: American Whaling

Location	test	Location	test	Location	test
6005	jump	6514	ycw19	7007	ab111
6005-7	"	6517	"	7008	"
6012-17	"	6525	"	7009	"
6023	"	6530	"	7010	"
6030	xort	6537	"	7011	"
6043	jump	6541	"	7012	"
6046	blink	6546	"	7013	"
6055	"	6550	"	7014	"
6063	"	6557	"	7015	"
6073	"	6563	"	7016	"
		6574	tant	7017	"
6103	jump			7018	"
6110	xort	6580	tant	7415	clink
6163	"	6583	"	7427	"
6166	"	6592	"		
6206	glotgh	6720	addted	7507	ab104
6209	"	6731	"		
6224	"	6745	"	7656	clink
6230	"	6761	"	7660	ab104
6232	"	6764	"		
6237	"	6767	"	7726	trial 2000
6243	"	6772	"		
6247	"	6775	"		
6253	"				
6256	"	7002	addted		
6262	"	7005	"		
6265	"	7010	"		
6270	"	7015	"		
6273	"	7072	ab104		
6304	1100	7124	clink		
6311	"	7127	"		
6316	"	7132	"		
6323	"				
6327	"	7033	clink		
6332	"	7036	"		
6335	"	7041	"		
6340	"	7046	"		
6345	"	7052	"		
6351	"	7056	"		
6384	azmt				
6405	dant				
6424	1st				
6446	"				
6475	noise				